

Comment on "Synoptic and Mesoscale Aspects of an Appalachian Ice Storm Associated with Cold-Air Damming"

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In their article, Forbes et al. (1987) present evidence indicating large deviations of the surface winds east of the Appalachians from either geostrophic or gradient wind balance. They estimate the surface geostrophic wind based on analyses of three different scalar fields. Two of these analyses, of sea-level pressures and of pressures adjusted to the 600 m level, are discussed qualitatively. The third, an objective analysis of altimeter settings, is used to quantitatively evaluate the effects of the ageostrophic wind. Although the authors caution that all three methods yield only approximations to the surface geostrophic wind, it appears they failed to account even approximately for the problem with raw altimeter settings over sloping terrain.

As emphasized recently by Sangster (1987), altimeter settings only adjust for the change of pressure with height in the standard atmosphere. When the actual temperature deviates from the standard, the altimeter setting (or, equivalently, the D-value) changes with height. In the case studied by the authors, in the area of largest analyzed ageostrophic wind speed (19 m s^{-1} northerly component in Fig. 15), the percent deviation of the surface temperature from standard is approximately -0.045 (S^* using Sangster's notation). In the same area, station elevations increase to the west an average of 400 m in 100 km. Under these conditions, independent of any horizontal pressure gradient, D-

values decrease to the west 18 m in 100 km, corresponding approximately to a pressure decrease (in addition to the decrease in the standard atmosphere) of 225 Pa or 0.06 in. Hg. The statements at the end of section 4b indicate that this additional vertical change has not been corrected. If not, then nearly all of the ageostrophic wind speeds analyzed at this point could be attributed to an overestimate of the surface geostrophic wind. The geostrophic wind would also be poorly approximated at other locations where there are large gradients in surface station elevation.

Altimeter settings could be adjusted using either Sangster's method or, perhaps, a simple adjustment to 300 m with an approximation of a constant S^* . In either case, the result would still yield only an estimate of the geostrophic wind. The improved estimate would likely show northerly ageostrophic wind maxima 50–100 km west of those analyzed by the authors. The significance of this is that the strong southerly geostrophic winds would be located near the west edge of the eastern slope of the Appalachians, not at the eastern edge.

REFERENCES

- Forbes, G. S., R. A. Anthes and D. W. Thomson, 1987: Synoptic and mesoscale aspects of an Appalachian ice storm associated with cold-air damming. *Mon. Wea. Rev.*, **115**, 564–591.
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